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a different title.[1] The most important change noted is the increased number of types discussed, and the presentation of these in a connected account. In harmony with this plan many unrelated details, especially concerning the vegetative structure of the higher plants, are omitted. Though the number of forms discussed is increased from eleven to twenty-five, the size of the book is reduced, having three-fourths the number of pages in *Plant Dissection.* The types selected illustrate very well the probable steps in the evolution of plants, and the discussions are exceedingly clear and suggestive. It seems to the reviewer, however, that the introduction of a heterogamous confervoid form might have strengthened the presentation of the subject of heterogamy among the algae. So long as teachers have too large classes and too little time for purely inductive study in the laboratory, some form of written direction seems indispensable. *Plant Morphology* meets this demand in a most helpful way. A possible danger may lie in its excellence, in that weak teachers may depend upon it too fully and neglect the personal relation which should accompany laboratory study of this character. —R. B. WYLIE.

NOTES FOR STUDENTS.

Allen[2] has recently published in full the results of his study of nuclear division in the pollen mother-cells of *Lilium canadense*, following the preliminary announcement which appeared last year.[3] This paper is of especial interest in relation to the final paper of FARMER and MOORE on the reduction divisions in animals and plants, since Allen reaches fundamentally different conclusions as to the events of synapsis and the preparations for the heterotypic mitosis. As FARMER and MOORE also studied a species of Lilium (*L. candidum*), it seems hardly possible that both accounts can be correct, so that the line separating the two schools is sharply drawn in these accounts of a similar form. One school is led by FARMER and MOORE, and finds support in STRASBURGER'S recent paper *Ueber reduktionsteilung* (1904), and in the recent work of GREGORY on the leptosporangiate ferns, and of WILLIAMS on Dictyota. With ALLEN are associated in the chief point of dispute (the formation of the bivalent chromosomes of the heterotypic mitosis) the botanists of the Carnoy Institute, GREGOIRE and BERGHS, and also ROSENBERG.

ALLEN'S account is chiefly remarkable for the detailed study of the events preceding and following synapsis, which are presented in greater detail than in any previous investigation. The nucleus of the young pollen mother-cell contains a network of large irregular masses, derived from the chromosomes of the preceding mitosis in the archesporium, and connected by fibers. As the nucleus increases in size, the chromatin knots become widely separated, and the nucleoli

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[1] CALDWELL, O. W., Handbook of Plant Morphology. 12mo. pp. viii+190. New York: Henry Holt & Co. 1904.

[2] ALLEN, C. E., Nuclear division in the pollen mother-cells of *Lilium canadense*. Annals of Botany **19**:189–258. *pls. 6–9.* 1905.

[3] BOTANICAL GAZETTE **37**:464. 1894.

are clearly distinct from the network. During synapsis the reticulum becomes transformed into a definite spirem. the fibers thickening apparently by the distribution of material from the knots, which become less conspicuous. The fibers now arrange themselves in pairs, and a general contraction of the reticulum takes place, probably associated with this approximation of the fibers. There is thus formed a continuous spirem in the nucleus, which is plainly composed of two slender threads lying side by side and probably with no free ends. The two threads often run closely parallel, sometimes loosely twisted about one another, sometimes in contact and apparently fused, and sometimes rather widely separated. It is clear that the double nature of the spirem is not due to a fission, but that two independent threads are developed out of the reticulum. The two threads are regarded as of paternal and maternal origin respectively. They gradually fuse, so that in later stages of synapsis the nucleus appears to contain a relatively thick single (fusion) spirem, which is shorter and more loosely coiled than in earlier stages. Each thread of the pair consists of a series of chromatin granules (chromomeres) imbedded in a ground substance (linin). As the two threads unite, the chromomeres generally come together in pairs and fuse to form a single row of larger chromomeres. The single (fusion) spirem on emerging from synapsis becomes uniformly distributed throughout the nucleus as a much convoluted thread. Some of the loops become fastened to the periphery of the nucleus. There is no regularity in the number of chromatic segments which are formed later.

While evenly distributed the single (fusion) spirem undergoes a longitudinal fusion into two threads, which is preceded by a division of each fusion chromomere. This is the first longitudinal fusion, well known from the descriptions of GREGOIRE, GUIGNARD, MOTTIER, and others. The split spirem now segments into the reduced number of chromatic elements (bivalent chromosomes) characteristic of the heterotypic mitosis. The first free ends of the segments usually appear at the periphery of the nucleus, where it is evident that the split spirem breaks apart at the loops. The segments of the split spirem now shorten and thicken, taking on the various forms peculiar to the heterotypic mitosis. They are obviously pairs of chromosomes, which stand for the full number of sporophytic elements (24), now associated to form a reduced number (12) of bivalent chromosomes. Shortly after the segmentation of the spirem the chromosomes of each pair may show evidence of the second longitudinal fission, which is completed during the metaphase of the heterotypic mitosis. Meanwhile the spindle of the heterotypic mitosis is being organized, the position of the bivalent chromosomes is shifted, and they are arranged on the nuclear plate where the elements of each pair separate as the so-called daughter chromosomes of the heterotypic mitosis. This first division in the spore mother-cell then simply distributes in two sets the twenty-four sporophytic chromosomes which ALLEN believes to have been derived from a maternal and paternal spirem. The second longitudinal fission which becomes conspicuous during metaphase of the heterotypic mitosis is clearly a premature fission of the chromosomes which are to enter the second nuclear division (homotypic). There is no true resting period between the two mitoses, and the chromosomes which leave the heterotypic figure pass morphologically unchanged into the homotypic.

The chief points of difference between ALLEN'S account and that of FARMER and MOORE are briefly as follows: FARMER and MOORE fail to find the organization of two threads preliminary to the formation of the single spirem which emerges from synapsis. They recognize only one longitudinal fusion of this spirem, which is regarded as preliminary to the formation of the chromosomes of the homotypic mitosis. The pairs of chromosomes of the heterotypic mitosis are believed to arise by the approximation of the arms of loops and their separation at the head. The theoretical aspects of these two views in relation to the significance of the reducing division cannot be considered here. The accounts themselves rest on matters of fact and not of interpretation, and one or the other is likely to fall, for it is hardly possible that both can be right, especially since they treat of the same form.

ALLEN presents at the end of his paper a thorough and very interesting discussion of his conclusions in their relation to problems of heredity and hybridization.—B. M. DAVIS.

THE SUBJECT of soil inoculation for legumes has recently acquired a widespread interest in this country, first, from numerous popular accounts relating to the subject, and again on account of a widely advertised commercial product by which is it claimed the proper bacteria can be introduced into the soil. For this reason MOORE'S account[4] of his work in this field is of special interest. The first part of the bulletin is a general historical account dealing with the various methods by which nitrogen is fixed in the soil, and leading up to the discoveries of HELRIEGEL and WILLFARTH connecting the fixation of nitrogen by legumes with the tubercles on the roots, and the discovery of bacteria in these tubercles by WORONIN. The chief results of MOORE'S investigations may be briefly stated as follows. The root-tubercle organism exists in three well-defined forms. In the soil it has the form of extremely minute motile rods. These possess the power of infecting the root hairs of leguminous plants. Within the root the organisms multiply enormously and produce the hypha-like "infection threads" passing through the tissues of the host. These curious fungus-like structures have often been observed and figured, and have been the objects of much discussion. Their explanation is that they are zooglaea-masses composed of numerous minute bacteria. These minute bacteria soon give rise to larger rod-shaped forms which may or may not be motile. These finally produce the branched forms peculiar to the legume-nodule. It is only this last form that is of any benefit to the plants, for in this state the bacteria are broken down and their contents made available. The name of the organism is changed to *Pseudomonas radicicola*, since the motile rods have flagellae only on one end. There is only a single species, but several forms or races occur adapted to certain species of legumes. Their slight racial characteristics may be easily broken down by cultivation. The results of studies on the nitrogen-fixing power of the bacteria are extremely interesting, showing that the supposed symbiotic relation between the organism and the root probably does not exist. It is rather to be regarded as a parasite, its nitrogen value being merely incidental to the death of the organism. The nitrogen is fixed by the tubercle-forming bacteria within their bodies. This was determined by cultures in flasks containing nutrient solutions without nitrogen. There was no increase of nitrogen in the solution, but a marked increase in the organisms themselves. In its biology the organism is therefore considered a parasite. Later the plant is able to overcome the parasite and profit by the nitrogen which has been fixed. When grown on nitrogenous media, it was found that the organism lost both its power of infecting leguminous plants and its power of fixing nitrogen. In non-nitrogenous media both of these properties were retained. The failure of NOBBE's attempts in Germany a few years ago to put upon the market pure cultures of this organism can probably be attributed to lack of recognition of this fact. As a result of these studies MOORE has devised a method of putting up for distribution pure cultures of *Pseudomonas radicicola*, grown in nitrogen-free media and dried on cotton immersed in the culture. These cultures are sent out by the U. S. Department of Agriculture together with packages of nutrient salts to multiply the organism. The mass-culture thus obtained is used to inoculate the seed or the soil. Numerous reports from farmers of all states indicate that this method will prove successful and practicable.[5]—H. HASSELBRING.

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[4] MOORE, G. T., Soil inoculation for legumes, etc., U. S. Dept. of Agric., Bureau of Plant Industry, Bull. 71, pp. 72. *pls. 10.* 1905.

WÄCHTER[6] has endeavored to solve some of the problems arising from the investigations of PURIEWITSCH on the autodepletion of storage organs. The latter author found inorganic salt solutions to behave as isotonic sugar solutions in accomplishing an inhibition of autodepletion. For this fact PURIEWITSCH accounted by assuming an incipient plasmolysis of the protoplasm, and in cases where inhibition is accomplished by dilute salt solutions he resorted to a fluctuating permeability of the plasma for explanation. WÄCHTER is apparently skeptical of both explanations. For his material the author selected the onion, expecting to avoid such difficulties as are associated with the inversion of insoluble storage products, being able thus to deal only with diosmosing substance, which was supposed to be chiefly glucose in the onion. He finds, however, that glucose is not the chief storage product; that other not directly reducing carbohydrates are present in fully equal amount, and that they exosmose into water or into salt solution in far greater proportion than does the glucose. For this fact the author remains unable to account. Attempts to correlate with external conditions the relative amounts of reducing and non-reducing sugar exosmosing were unsuccessful. Further experiments indicate that only a partial depletion of such storage organs is possible, while PURIEWITSCH believed complete depletion possible. WÄCHTER believes from his results that the density of the external medium is not a factor in depletion, for he found that even with exosmosis inhibited the density of the cell sap was greater than that of the external fluid. The author remains uncommitted as to the fluctuating permeability of the plasma, and insists that further investigation is necessary to answer this question.—RAYMOND H. POND.

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[5] By an oversight, only a portion of this review appeared in the BOTANICAL GAZETTE for May, p. 371.—EDS.

[6] WÄCHTER, W., Untersuchungen über den Austritt von Zucker aus den Zellen der Speicherorgane von *Allium Cepa* und *Beta vulgaris*. Jahrb. Wiss. Bot. **41**:165–220. *fig. 1.* 1905.

THE X-GENERATION and the 2x-generation is the title of an interesting philosophical paper by LOTSY.[7] The nuclei of the x-generation contains only one-half the number of chromosomes as do the nuclei of the 2x-generation. Only asexually reproducing organisms have the x-number of chromosomes. Then which generation should be called the x-generation? If the fern plant is the x-generation, the prothallium is a $\frac{1}{2}$x-generation; if the prothallium is the x-generation, the fern plant is a 2x-generation. The behavior of the chromatin during fertilization and during the reduction of chromosomes shows that the x-generation is the primitive generation, and that the 2x-generation is later, and that its double number of chromosomes is due to fertilization. Thus the ancient question of the philosophers, which came first, the hen or the egg, can be answered by merely counting the chromosomes. The 2x-generation cannot exist indefinitely, but sooner or later must form reproductive cells in which the primitive number of chromosomes is restored. This reversion to the x-generation consists in the separation of the paternal and maternal chromosomes. The process is preceded by the pairing of these chromosomes, which have remained separated throughout the vegetative life of the organism. Numerical reduction of chromosomes is the expression of this pairing. LOTSY does not hesitate to apply the theory to animals, the body representing the 2x-generation, while the x-generation is reduced to the sexual cells.—C. J. CHAMBERLAIN.

THOMSON[8] has been investigating the megaspore membrane or coat of gymnosperms, naturally applying the term to the investing coat of the prothallium as well as to the coat of the uninucleate spore. This coat is present in all gymnosperms except the Taxeae, among which it is entirely eliminated or nearly so. It consists of two layers, the outer one being suberized, while the inner one is composite in character, being suberized in its outer portion and containing cellulose in its inner portion associated with a substance resembling pectin. In fact, the megaspore coat resembles in structure and composition the microspore coat. The only exception to this general character of the megaspore coat is found among the Araucariae, where the suberized outer layer is wanting. In the forms possessing the usual type of membrane, there is present a more or less well-developed tapetum, derived from the sporogenous tissue, which is quite distinct from that derived from nucellar tissue. Using the relative development of the megaspore coat and of the tapetum as a basis, the author concludes that the Abieteae are the most ancient group of Coniferales and the Taxeae the most recent; that the Taxodieae and Podocarpeae are complex, including both ancient and recent forms; and that the Cupresseae occupy an intermediate position in the phylogenetic series.—J. M. C.

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[7] LOTSY, J. P., Die x-Generation und die 2x-Generation, eine Arbeitshypothese Biol. Centralbl. **25**:97–117. *4 diagrams.* 1905.

[8] THOMSON, R. B., The megaspore-membrane of the gymnosperms. Univ. of Toronto Biol. Series, No. 4, pp. 64. *pls. 5.* 1905.

NICOLOSI RONCATI[9] has published an account of the ovule of *Anona Cherimolia*. A row of four megaspores and considerable parietal tissue are formed. The innermost megaspore develops a narrow and much elongated embryo sac, whose antipodals appear to be ephemeral. The first divisions of the endosperm cells result in a series of walls across the narrow sac, which is thus divided into a linear series of five or six large chambers. Subsequent divisions fill these chambers with endosperm tissue. The embryo, as figured, has no definite suspensor, but is at first a globular mass of cells. The "rumination of the seed," characteristic of Anonaceae, is attributed by the author to the invasion of the perisperm by infoldings, chiefly from the inner integument. If this be true, it is entirely different from the "rumination" to be observed in Asimina and in Torreya. The name "reserve idioblasts" is given to masses of nutritive material found in abundance in cells along the convolutions of the "rumination," and thought to supply nutrition to the embryo after the endosperm has been digested and the perisperm contains an insufficient nutritive supply. The paper was presented to the Academy by Professor CAVARA.—J. M. C.

JONES[10] has published an account of the anatomy of the stem of Lycopodium. The general conclusions reached are as follows: The development of the vascular system has proceeded along two lines: (1) as the protoxylems increase in number, a series of alternating bands of xylem and phloem is developed; (2) the phloem is scattered through the mass of xylem in more or less isolated patches, until a structure is produced that simulates that of Gleichenia. The first form is developed in creeping stems, the second is characteristic of tropical epiphytes. The young stem has a triarch or tetrarch structure; and the complex structure of larger stems is developed from this by the division of one of the protoxylems into two strands, and by the separation of a phloem into two portions; subsequently, another protoxylem divides, and this process, together with the splitting of the phloem, is repeated until the number of protoxylems and protophloems reaches the number present in the large stem. The disposition of xylem and phloem is constantly altering, the length through which a definite portion of tissue (as a phloem-island) may be traced varying from 0.5 to 8^{mm}.—J. M. C.

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[9] RONCATI, F. NICOLOSI, Sviluppo dell' ovulo e del seme nella *Anona Cherimolia* Mill. Atti Acad. Gioenia Sci. Nat. Catania IV. **18**:Mem. 2. pp. 26. *pl. 1.* 1904.

[10] JONES, CHARLES EDWARD, The morphology and anatomy of the stem of the genus Lycopodium. Trans. Linn. Soc. London. II. Bot. **7**:15–35. *pls. 3–5.* 1905.

ROSE has published a fourth paper under the title "Studies of Mexican and Central American plants."[11] The contribution involves twenty-three families, under which the miscellaneous titles are grouped. Two new genera are described, one (*Ornithocarpa*) in Cruciferae, the other (*Raimannia*) in Onagraceae. The new species described belong to Ostrya (2), Synthlipsis, Thelypodium, Lepidium, Echeveria (2), Ribes (7), Neptunia, Cercidium (3), Parosela (12), Lupinus (16), Indigofera (4), Phaseolus (3), Aeschynomene, Cologania, Crotalaria, Harpalyce, Willardia, Erythroxylon (3), Cedrela, Polygala, Vitis, Heliocarpus (3), Tilia (2), Abutilon (3), Kosteletzkya (2), Robinsonella (2), Ceiba (2), Ayenia (2), Melochia, Taonabo (3), Heterocentron, Conostegia, Monochaetum, Hartmannia (3), Raimannia (3), Eryngium (6), Prionosciadium (5), Arracacia, Coulterophytum, Ligusticum, Museniopsis (2), Oaxacana, Roseanthus, and Schizocarpum. The new genus Raimannia replaces Oenothera as recently understood, twelve species being given as belonging to it; and the name Oenothera replaces Onagra. There is also a synopsis of the Mexican species of Ribes.—J. M. C.

OAKES AMES[12] has begun a sumptuous series of publications dealing with the taxonomy of Orchidaceae. Its purpose is "to illustrate, from type material when possible, new or recently described orchid species, and species heretofore inadequately figured; to publish the original descriptions of all species so figured, with additional characterization, full synonymy, and geographical distribution; to furnish descriptions and descriptive lists of orchidaceous plants, which may prove useful in the study of regional floras; and to communicate the results of critical investigations among special genera." In the first fascicle nineteen species are described and illustrated, five of which are new, the plates being drawn by Blanche Ames and made by the Heliotype Company. There are also the following contents: A descriptive list of orchidaceous plants collected in the Philippine Islands by botanists of the U. S. Government (including sixteen new species); an Oncidium new to the United States; Contributions toward a monograph of the American species of Spiranthes; and A synopsis of the genus Spiranthes north of Mexico.—J. M. C.

KIENITZ-GERLOFF[13] has published a small book dealing with bacteriology. As indicated by the title, it gives a general condensed view of the modern field of bacteriology in its relation to the home, the kitchen, the dairy, etc. A general introduction deals with the evolution of the modern theory of fermentation as resulting from PASTEUR's work on spontaneous generation. An insight is given into the relations of molds, fungi, bacteria, and yeasts to each other, with an outline of their general morphology and classification. Modern methods of cultivation and the introduction of pure cultures in fermentation industries and dairies are discussed. A short chapter is devoted to the activity of bacteria in the soil and their relation to agriculture. Considerable space is finally devoted to pathogens, and the spread of infectious and contagious diseases. Advice and methods are given as to their prevention and treatment. A number of illustrations elucidate the text. The whole book represents a good summary of our present knowledge of micro-organisms in a concise, popular style.—P. HEINEMANN.

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[11] ROSE, J. N., Studies of Mexican and Central American plants. Contrib. U. S. Nat. Herb. **8**:281–339. *pls. 63–72. figs. 14–19.* 1905.

[12] AMES, OAKES, Orchidaceae: illustrations and studies of the family Orchidaceae issuing from the Ames Botanical Laboratory, North Easton, Mass. Fasc. I. pp. vii+156. *pls. 16.* Boston and New York: Houghton, Mifflin and Company. 1905.

[13] KIENITZ-GERLOFF, FELIX, Bakterien und Hefen insbesondere in ihren Beziehungen zur Haus- und Landwirtschaft zu den Gewerben, sowie zur Gesundheitspflege nach dem gegenwärtigen Stande der Wissenschaft gemeinverständlich dargestellt. 8vo. pp. 100. Berlin: Otto Salle. 1904.

GOEBEL[14] has investigated the cleistogamous flowers of a variety of plants from the point of view especially of the adaptation theory, and presents an interesting account of the external condition under which these occur in nature, or can be made to occur in culture. It appears that a large number of plants have the ability to produce cleistogamous instead of chasmogamous flowers under the influence of certain external conditions. Contrary to the belief of DARWIN and others, GOEBEL shows that there is no causal connection between the absence of fertilization, or the formation of seed, and the appearance of cleistogamous flowers. The latter is due to insufficient food relations, and this may arise from poor soil, a lack of mineral constituents, or insufficient light. In many plants the cleistogamous flowers do not set seed. In these cases the appearance of cleistogamous flowers is not due to the suppression of seed-formation, but GOEBEL thinks the seed-formation is suppressed by the appearance of cleistogamous flowers.—W. B. MCCALLUM.

MOLISCH[15] has reported convincing evidence that stems of certain seedlings respond with positive curvatures when exposed to rays emanating from sealed tubes containing a mixture of radium and zincsulfid. The seedlings should be less than 7^{cm} distant from the tubes and preferably about 2^{cm}. Tubes containing radium bromid only (activity 3000) fail to give positive results, as previously found by DIXON. When radium bromid and zincsulfid are mixed, however, a steady phosphorescence of considerable intensity develops, due to the influence of the radium on the zincsulfid. MOLISCH therefore regards the curves obtained as heliotropic, indirectly induced by radium. The interesting fact is also recorded that while such experiments succeed in the laboratory they usually fail in the greenhouse. The author believes that the illuminating gas and other volatile impurities in laboratory air reduce the negative geotropism, thereby increasing sensitiveness to phosphorescence and heliotropic stimulus.—RAYMOND H. POND.

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[14] GOEBEL, K., Die kleistogamen Blüten und die Anpassunpstheorie. Biol. Centralbl. **24**:673–697, etc. 1904.

[15] MOLISCH, HANS, Ueber Heliotropismus, indirekt hervorgerufen durch Radium. Ber. Deutsch. Bot. Gesells. **23**:2–7. *fig. 1.* 1905.

THE FIRST CASE of the regeneration of the whole plant from tendrils is described by WINKLER.[16] VÖCHTING first showed that the tendrils of *Vitis vinifera* will produce roots, but on *Passiflora coerulea* WINKLER finds that the isolated tendrils will give rise to both roots and shoots. Young tendrils were cut off and placed in damp sand. They continued to live, but soon became quite woody, and in the course of some weeks formed a callus at the base. After three or four months a root is formed from this callus, and after some months more two shoots arise, also from the callus. The leaves of this plant also form roots and shoots in the same way when similarly treated. The fact is pointed out that the shoots formed from the primary undivided leaves continue to form primary leaves much longer than those formed on the adult leaves. On isolated pieces of stem internodes new shoots arise from the callus at the base.—W. B. MCCALLUM.

POURIEVITCH[17] shows by experiment that the investigations of BONNIER, and MANGIN which have been the basis for the prevailing opinion that the ratio $\frac{CO_2}{O_2}$ does not vary with temperature include some errors, namely comparisons of incomparable material, and tests of too short duration to permit the test objects to acquire the temperature intended for the test. From his own investigations, in which such errors and others are apparently avoided, the author concludes that the ratio $\frac{CO_2}{O_2}$ changes according to temperature, becoming greater as the latter rises. This influence of temperature is most noticeable in young organs, and depends upon the kind of nutritive substance present in the tissues. When this nutritive substance disappears from the tissue, the influence of temperature on the ratio $\frac{CO_2}{O_2}$ becomes less noticeable.—RAYMOND H. POND.

SPALDING showed that when roots are wounded near the tip and traumatropic curvature prevented by placing them in plaster for as long as eight days, they will when removed from the plaster curve in the same way and with the same reaction time as they would have done had they been allowed to do so at first. He considers that the latent period has been prolonged all this time. BURNS[18] has reinvestigated this problem and finds that so long as the wounded tissue persists the stimulus to traumatropic curvature still exists, and unless mechanically prevented the root will curve. When regeneration of the wounded tissue is completed the stimulus is removed. There is thus not a prolongation of the latent period, but a continuation of the stimulus.—W. B. MCCALLUM.

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[16] WINKLER, H., Ueber regenerative Sprossbildung an der Ranken, Blättern und Internodien von *Passiflora coerulea* L. Ber. Deutsch. Bot. Gesells. **23**:45–48. 1905.

[17] POURIEVITCH, M. K., Influence de la température sur la respiration des plantes. Ann. Sci. Nat. Bot. IX. **1**:1–32. 1905.

[18] BURNS, G. P., Regeneration and its relation to traumatropism. Beih. Bot. Centralbl. **28**:159–164. *figs. 4.* 1904.

PRIANISCHNIKOW[19] presents a preliminary report of sand culture experiments which extend his investigations of 1900 on the relative value of different phosphates in plant nutrition. As in the earlier work he found ammonium sulfate to be a "physiologically acid" salt, so now he finds, contrary to all expectations, that ammonium nitrate can also function as a "physiologically acid" salt. This peculiar acidity is much less in the case of ammonium nitrate, however, than in that of ammonium sulfate. The phrase "physiologically acid" is used in the sense suggested by ADOLPH MEYER as applied to a salt whose basic group is more rapidly appropriated by the plant than its acid group.—RAYMOND H. POND.

WORSDELL[20] has discussed the meaning and origin of the phenomenon ordinarily called fasciation, including not merely those abnormal appearances to which the term is ordinarily applied, but also "normal fasciation" as exemplified by such stamen clusters as appear in Hypericaceae and Malvaceae. His contention is that in the development of a structure there are two opposing tendencies, the younger being a tendency to integrity, the latter being a tendency to plurality, and that the condition of the mature structure is the resultant. The mechanical cause suggested has to do with the distribution and functioning of "growth centers."—J. M. C.

PINCHOT[21] has published a second part of his *Primer of Forestry*, dealing with the practice of forestry, work in the woods, and the relation of the forest to weather and streams. There is also a short account of forestry at home and abroad. Numerous reproductions from photographs fill out what is a very satisfactory elementary account of practical forestry. Such literature, prepared by those who have the most ample information, will do more than anything else to educate the intelligent public as to the meaning and need of forestry.—J. M. C.

A GENERAL ACCOUNT of the vegetation of the island of Guam has been published by W. E. SAFFORD.[22] The account includes some reference to every plant known to occur on the island, and discusses the principal plants used for food, fiber, oil, starch, sugar, and forage in the Pacific tropical islands recently acquired by the United States. The method of cultivating and propagating the more important species is treated in considerable detail. While the paper is somewhat miscellaneous as to contents, it is full of information for botanists.—J. M. C.

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[19] PRIANISCHNIKOW, D., Ueber den Einfluss von Ammoniumsalzen auf die Aufnahme von Phosphorsäure bei höheren Pflanzen. Ber. Deutsch. Bot. Gesells. **23**:8–17. 1905.

[20] WORSDELL, W. C., "Fasciation:" its meaning and origin. New Phytologist **4**:55–74. *figs. 17–24.* 1905.

[21] PINCHOT, GIFFORD, A primer of forestry. Part II. Practical forestry. U. S. Department of Agriculture, Bureau of Forestry, Bull. 24. part 2. pp. 88. 1905.

[22] SAFFORD, WILLIAM EDWIN, The useful plants of the island of Guam, with an introductory account of the physical features and natural history of the island, of the character and history of its people, and of their agriculture. Contrib. U. S. Nat. Herb. **9**:1–416. *pls. 1–69.* 1905.

A SMALL MANUAL of poisonous plants has been prepared by A. BERNHARD SMITH.[23] It contains plants from all countries, with their active principles and toxic symptoms, together with the proper treatment in case of poisoning. The main divisions are four in number: (1) plants acting on the brain; (2) those acting on the spinal cord; (3) those acting on the heart; and (4) vegetable irritants. Subdivisions on the basis of symptoms lead one easily to the different groups of plants.—J. M. C.

THE RECENT ADDRESS of Professor D. H. SCOTT as president of the Royal Microscopical Society dealt with the subject of the so-called Carboniferous ferns,[24] which comprise about half of the total known flora. The recent discoveries of seed-bearing forms among them were reviewed, and the conclusion reached that in all probability only a minority of these reputed ferns are really ferns, and that probably the majority of them are seed-bearing plants.—J. M. C.

ARBER[25] has described two new species of the seed-genus Lagenostoma, whose chief interest is its relation to Lyginodendron. An important point in connection with these new species is that the seeds, "with or without a cupular investment," terminate the ultimate branches of what is probably a modified fertile leaf.—J. M. C.

JOHNSTON[26] has published thirty-five new species preliminary to the publication of a flora of the Islands of Margarita and Coche, Venezuela. Among them there is a new genus (*Anguriopsis*) of Cucurbitaceae.—J. M. C.

IN CONTINUING his revision of Eucalyptus, MAIDEN[1] presents *E. amygdalina*, *E. linearis*, and *E. Risdoni*, under each species giving the description, synonymy, range, and affinity.—J. M. C.

SMITH[28] has published an account of three diseases of truck crops in Delaware: (1) a leaf-spot of cucumber, squash, melon, and cantaloupe due to *Sphaerella citrullina;* (2) a leaf-spot of the egg-plant due to *Ascochyta lycopersici;* and (3) a leaf-spot of the bean and cow pea due to *Phyllosticta phaseolina*. Brief descriptions are given in each case of the fungus itself and its behavior in pure cultures and inoculation experiments. No experiments in the treatment of these diseases are reported. The paper should be of interest to mycologists.—E. MEAD WILCOX.

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[23] SMITH, A. BERNHARD, Poisonous plants of all countries. pp. xv+88. Bristol: John Wright & Co. 1905.

[24] SCOTT, DUKINFIELD H., What were the Carboniferous ferns? Jour. Roy. Micr. Soc. 1905: 137–149. *pls. 1–3. figs. 32–33.*

[25] ARBER, E. A. NEWELL, On some new species of Lagenostoma: a type of pteridospermous seed from the Coal-measures (abstract). Annals of Botany **19**:326–328. 1905.

[26] JOHNSTON, J. R., New plants from the islands of Margarita and Coche, Venezuela. Proc. Amer. Acad. **40**:683–698. 1905.

[27] MAIDEN, J. H., A critical revision of the genus Eucalyptus. Part VI. *pls. 4.* Published by the authority of the Government of the State of New South Wales. 1905. *2s. 6d.*

[28] SMITH, C. O., The study of the diseases of some truck crops in Delaware. Bull. Del. Exp. Sta. 70. pp. 16. *pls. 2. figs. 6.* 1905.

ROLFS[29] has published his second contribution to the knowledge of a potato disease, called the rosette by SELBY,[30] due to the sterile fungus Rhizoctonia. The author has conducted extensive experiments both in the treatment of the disease and in the study of the life history of the fungus. He finds that the corticium or fruiting stage of the fungus develops freely upon the living stems of the diseased plants, but considers the sclerotial bodies which are common on both stems and tubers the most important agents in the distribution of the fungus. Formalin treatment of the tubers to be planted improved the appearance of the crop but reduced the yield. The corrosive sublimate solution treatment gave good returns when the land employed for the crop was new. Liming the soil and treating the "seed" tubers with sulfur gave negative results. The following recommendations are also made: (1) clean tubers should be carefully selected from healthy tubers for planting, (2) all vines and stems of weeds should be gathered and burned at the end of the season, (3) care must be taken to see that the fertility of the soil is maintained, that through proper methods of cultivation the soil is well aërated, and that where irrigation is employed the water is applied to the land at frequent intervals and in proper amounts, taking care not to allow the soil immediately about the forming tubers to become too wet.—E. MEAD WILCOX.

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[29] ROLFS, F. M., Potato failures. A second report. Bull. Col. Exp. Sta. 91. pp. 33. *pls*. 5. 1904. See Bull. 70 Col. Exp. Sta. for the preliminary report upon this subject.

[30] See Bulletins 139 and 145 of the Ohio Experiment Station.